

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number  
**WO 2005/021153 A3**

(51) International Patent Classification<sup>7</sup>: **B01J 31/22**, 37/30, C07F 15/00

(21) International Application Number: **PCT/EP2004/008964**

(22) International Filing Date: 10 August 2004 (10.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
103 39 790.6 28 August 2003 (28.08.2003) DE

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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designation US

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

Published:  
— with international search report  
— with amended claims

(88) Date of publication of the international search report: 12 May 2005

Date of publication of the amended claims: 7 July 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/021153 A3

(54) Title: DIENE-BIS-AQUO-RHODIUM(I) COMPLEXES, PROCESS FOR PREPARING THEM AND THEIR USE

(57) Abstract: Diene-bis-aquo-rhodium(I) complex of the general formula [Rh(diene)(H<sub>2</sub>O)<sub>2</sub>]X where diene is a cyclic diene and X is a noncoordinating anion.

## AMENDED CLAIMS

[Received by the International Bureau on 17 May 2005 (17.05.2005)  
Original claims 1-15 unchanged ; new claims 16-20 (3 pages) ]

1. Diene-bis-aquo-rhodium(I) complex of the general formula (1):



where diene is a cyclic diene and X is a noncoordinating anion.

2. Diene-bis-aquo-rhodium(I) complex according to Claim 1, wherein diene is 1,5-cyclooctadiene (COD) or norbornadiene (NBD).
3. Diene-bis-aquo-rhodium(I) complex according to Claim 1 or 2, wherein X is a noncoordinating anion selected from  $\text{BF}_4^-$  and  $\text{CF}_3\text{SO}_3^-$ .
4. Diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 3 having the name 1,5-cyclooctadienebis aquorhodium(I) tetrafluoroborate.
5. Diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 3 having the name 1,5-cyclooctadienebis aquorhodium(I) trifluoromethylsulphonate.
6. Diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 5, wherein the complex is in the form of a solid.
7. Process for preparing a diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 6, which comprises reacting a rhodium(I)-olefin compound with silver salts in an aqueous solvent mixture, characterized in that the silver salt is not added as a solid to the reaction mixture but is instead prepared in solution and added in this form.

8. Process for preparing a diene-bis-aquo-rhodium(I) complex according to Claim 7, wherein the silver salt is prepared in solution by reacting silver oxide ( $\text{Ag}_2\text{O}$ ) with the acid corresponding to the noncoordinating anion of the diene-bis-aquo-rhodium(I) complex.
9. Process for preparing a diene-bis-aquo-rhodium(I) complex according to Claim 8 wherein the acid is used in an excess of up to 0.5 molar equivalents over the silver oxide.
10. Process for preparing a diene-bis-aquo-rhodium(I) complex according to any of Claims 7 to 9, wherein the preparation of the silver salt is carried out in an aqueous medium.
11. Process for preparing a diene-bis-aquo-rhodium(I) complex according to any of Claims 7 to 10, wherein the rhodium(I)-olefin compound is  $[\text{Rh}(\text{COD})\text{Cl}]_2$ .
12. Process for preparing a diene-bis-aquo-rhodium(I) complex according to any of Claims 7 to 11, wherein the aqueous solvent mixture comprises water together with up to 10% by volume of at least one alcoholic solvent.
13. Process for preparing a diene-bis-aquo-rhodium(I) complex according to Claim 12, wherein the alcoholic solvent is selected from methanol, ethanol, n-propanol, isopropanol, n-butanol and tert-butanol.
14. Use of a diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 6 in catalytic reactions.
15. Use of a diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 6 for preparing heterogeneous catalysts.
16. Use of a diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 6 for preparing a chirally nonselective, diastereoselective or enantioselective catalytically

active species.

17. Use according to Claim 16, wherein the diene-bis-aquo-rhodium(I) complex is reacted with achiral and/or chiral ligands with ligand exchange.
18. Use according to Claim 17, wherein the achiral and/or chiral ligands are selected from triphenylphosphine, ferrocenylphosphine, alkylphosphine or chiral phosphine.
19. Chirally nonselective, diastereoselective or enantioselective catalytically active species, obtainable by reacting a diene-bis-aquo-rhodium(I) complex according to any of Claims 1 to 6 with achiral and/or chiral ligands with ligand exchange.
20. Chirally nonselective, diastereoselective or enantioselective catalytically active species according to Claim 19, wherein the achiral and/or chiral ligands are selected from triphenylphosphine, ferrocenylphosphine, alkylphosphine or chiral phosphine.